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# NOTES AND EXTRACTS.

## THE PIONEER FORECASTERS OF HURRICANES.

WASHINGTON, D. C., *August 24, 1905.*

THE EDITOR,
THE WASHINGTON POST,
*Washington, D. C.*

DEAR SIR:

In answer to your editorial of this morning, in reference to a pamphlet published by Father Drum, permit me to say that there is no disagreement between the observers of Bélen College and the Weather Bureau, as is evidenced by the following communication:

GEORGETOWN UNIVERSITY,
WASHINGTON, D. C., *August 24, 1905.*

MR. WILLIS L. MOORE,
*Washington.*

DEAR PROFESSOR MOORE:

From the Washington Post of August 24, I observe that the brochure "The Pioneer Forecasters of Hurricanes" has given occasion to the conviction that there exists some friction between the Bélen College Observatory and the U. S. Weather Bureau, of Washington.

For four years I have been engaged in the Bélen Observatory and I can attest that the famous Father Viñes, as well as the present director, Father Gangoiti, have always appreciated and highly esteemed the labors of the Washington Weather Bureau, and that their relations with the same have at all times been most amicable.

It is well known that your officials and yourself, not on one occasion only, but repeatedly, have honorably and favorably referred to the forecasts and labors of the Bélen Observatory, and I am confident that what has been written concerning the change brought about by the introduction of the U. S. Weather Bureau into all the Antilles did not emanate from headquarters, and could not in the least refer to the island of Cuba or its meteorologists.

In behalf of my confréres of Bélen I wish to make this very sincere acknowledgment of the merits of the U. S. Weather Bureau, and of its undoubted services to the advance of science and to the profit, not only of the inhabitants of the States, but also of all neighboring countries.

I conclude,

Very truly yours,

(Signed) S. SARASOLA, S. J.

I am sure that Father Drum would not knowingly do an injustice to the Weather Bureau, which issued ample warnings to all shipping from one to two days in advance of the Galveston hurricane. A careful reading of his pamphlet will show that he was comparing the forecasts of Bélen College with the statements of some one of our local observers. He did not intend to criticise the Bureau as a whole; but the local observer had no authority to issue warnings for Gulf ports, and was not the official spokesman of the Bureau.

WILLIS L. MOORE,
*Chief U. S. Weather Bureau.*

## SIMULTANEOUS WEATHER ANOMALIES IN ICELAND AND EUROPE.

In the Meteorologische Zeitscrift for February, 1905, Dr. Julius Hann publishes under the title "Anomalies of the weather in Iceland, 1851-1900, and their relations to the simultaneous weather anomalies in northwest Europe," a short extract from a paper by him in the Sitzungsberichte der Wiener Akad., vol. 113, January, 1904. An English translation of the former by Dr. R. H. Scott appears in the Quarterly Journal of the Royal Meteorological Society, April, 1905, vol 31, No. 134, page 152. The following account has been compiled by consulting all three of these. The data here given are in English measures.

Doctor Hann discusses his subject in two phases, viz: (A) The simultaneous anomalies of temperature, pressure, and rainfall during the winter months at Stykkisholm, Greenwich, Brussels, and Vienna. (B) Relations between the oscilations of pressure at Stykkisholm and Ponta Delgada, Azores, or between the two centers of action of the atmosphere over the North Atlantic Ocean.

So far as Iceland is concerned the inquiry is based on the means of pressure and temperature for Stykkisholm, 1846-1900, for which station a long series of records, embracing all elements, was carried out by one man, Olaf Thorlacius, who observed from November, 1845, to the end of 1891, and has left the record for this long period without any gap. For Europe Hann used the records for Greenwich, Brussels, and Vienna for the period 1851-1900, and for the Azores the records for 1865-1890 at Ponta Delgada.

The great permanent subtropical area of high pressure about the Azores and the deep barometric minimum around Iceland, at the centers of which are situated Ponta Delgada and Stykkisholm, respectively, are designated "centers of action of the atmosphere" by Teisserenc de Bort.

Doctor Hann's study of the relations between these centers and the weather of western Europe tends to show that the weather anomalies of western Europe are closely and causally related to the occasional extensions of the Icelandic area of low pressure.

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(*A*) In the discussion of the simultaneous anomalies at Stykkisholm and at Greenwich, Brussels, and Vienna, which is restricted to the winter months, as the phenomena are more marked at that season, Doctor Hann finds the following results:

(1) The probability of a simultaneous opposition in the pressure departure at Stykkisholm and that in northwest and

central Europe amounts to 80 per cent in January, and 74 per cent in February, a mean of 70 per cent for the winter months.

(2) In a slight majority of cases the temperature departure from the mean at Stykkisholm is opposite to that in northwest Europe. No great weight is attached to this relation as the temperature anomaly is so often due to local causes.

(3) On comparing the pressure departures at Stykkisholm with the simultaneous temperature departures in northwest and central Europe it is found that a deepening of the pressure minimum over Iceland produces a rise in the winter temperatures of northwest and central Europe, and vica versa, a rise in the temperature over Iceland produces a fall in the winter temperatures over northwestern Europe.

(4) In the case of precipitation, simultaneous departures from the normal in opposite senses are found to occur at Stykkisholm and Brussels in 60 per cent of the cases. A much more decisive result than in the case of temperature. See (2) above.

(5) A comparison of the greater simultaneous pressure and temperature departures in all months was made by tabulating by months all the large pressure departures at Stykkisholm (.20 inch and over for October to April, inclusive, .136 inch and over in May and September, and .118 inch and over in June, July, and August), and then setting down beside these the mean of the simultaneous temperature departures at Brussels and Greenwich. The mean values of these corresponding variations for each month and the year are shown in Table 1:

TABLE 1.—*Large pressure departures at Stykkisholm and corresponding temperature departures at Greenwich and Brussels.*

| Month. | Positive departures. | | | | Negative departures. | | | |
|---|---|---|---|---|---|---|---|---|
| | Number of cases. | Pressure departure at Stykkisholm. | Mean of temperature departures at Brussels and Greenwich. | Signs not agreeing with means. | Number of cases. | Pressure departure at Stykkisholm. | Mean of temperature departures at Brussels and Greenwich. | Signs not agreeing with means. |
| | | *Inches.* | ° | | | *Inches.* | ° | |
| January | 11 | +.406 | −3.2 | 2 | 14 | −.311 | +2.5 | 2 |
| February | 12 | +.374 | −4.1 | 1 | 12 | −.347 | +2.5 | 2 |
| March | 10 | +.307 | −1.1 | 3 | 11 | −.303 | +3.1 | 0 |
| April | 10 | +.224 | −1.3 | 3 | 8 | −.264 | +0.7 | 2 |
| May | 7 | +.165 | −0.4 | 4 | 7 | −.224 | +2.5 | 1 |
| June | 9 | +.177 | −0.4 | 4 | 11 | −.169 | +0.7 | 3 |
| July | 9 | +.142 | −1.3 | 2 | 7 | −.165 | +0.4 | 3 |
| August | 10 | +.189 | −0.5 | 3 | 7 | −.181 | +2.0 | 0 |
| September | 10 | +.221 | −1.3 | 3 | 10 | −.193 | +1.3 | 3 |
| October | 10 | +.291 | −1.8 | 2 | 8 | −.291 | +0.9 | 1 |
| November | 14 | +.335 | −2.5 | 2 | 12 | −.303 | +2.5 | 1 |
| December | 10 | +.350 | −3.1 | 3 | 15 | −.264 | +2.7 | 1 |
| Year | 122 | +.272 | −1.8 | 32 | 122 | −.260 | +2.0 | 19 |

TABLE 2.—*Semiannual means of the larger pressure variations at Stykkisholm and the simultaneous temperature variations at Greenwich and Brussels.*

| Half year. | Positive pressure departures. | | | | Negative pressure departures. | | | |
|---|---|---|---|---|---|---|---|---|
| | Number of cases. | Mean pressure departure. | Mean temperature departure. | Probability. | Number of cases. | Mean pressure departure. | Mean temperature departure. | Probability. |
| | | *Inch.* | ° *F.* | | | *Inch.* | ° *F.* | |
| Winter | 67 | +.347 | −2.7 | 0.81 | 72 | −.303 | +2.4 | 0.90 |
| Summer | 55 | +.150 | −0.9 | 0.65 | 50 | −.208 | +1.2 | 0.76 |

It will be seen that a rising barometer in Iceland is accompanied by lower temperatures over northwest Europe in 74 per cent of the cases and that with a fall of the barometer in Iceland there is a simultaneous rise of temperature at the selected stations in 84 per cent of the cases. This table affords one of the most direct proofs that has been given as yet of the influence of the permanent barometric depression over Iceland in moderating the climate of northwest Europe. When the intensity of the Icelandic low is weakened it is at once shown by the lowering of the temperature in northwestern and even in central Europe.

That the influence of the great barometric departures in Iceland on the temperature of northwest Europe is greater in winter is shown by Table 2.

(6) It is natural to turn the question around and ask what were the pressure deviations at Stykkisholm at the time of the greatest positive and negative monthly and annual anomalies of temperature at Greenwich (1851 and 1900 for instance). In 42 cases of great positive temperature anomaly at Greenwich during 50 years it was found that a corresponding negative pressure anomaly existed at Stykkisholm in 83 per cent of the cases. Out of 41 cases of great negative departure 85 per cent coincided with a simultaneous positive anomaly at Stykkisholm. The mean values are shown in Table 3.

TABLE 3.—*Simultaneous variations of monthly mean pressure and temperature at Greenwich and Stykkisholm.*

| Temperature departures at Greenwich. | Pressure departures at Stykkisholm. |
|---|---|
| ° *F.* | *Inch.* |
| +4.9 | −.117 |
| −5.0 | +.185 |

(7) A similar comparison of the annual means shows a similar relation though the contrast is less strong, evidently this is due to the influence of the summer temperatures which are less dependent on the Icelandic minimum.

(8) A comparison of the rainfall at Brussels and Stykkisholm for the 22 years 1857–1878, shows opposite departures from the normal at the two places 90 per cent of the time, while for the 22 years 1879–1900, the departures were in the same sense 55 per cent of the time. This shows how easily short periods of records may lead to error.

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In the second part of his paper Doctor Hann deals with the relations between oscillations of pressure at Stykkisholm and Ponta Delgada, or between the two centers of action of the atmosphere of the North Atlantic Ocean.

To determine if these two centers of action are in any sort of relation of dependence, at least in regard to the intensity of their development, the departures of the monthly means of pressure at Ponta Delgada (1865–1890) were compared with the simultaneous departures at Stykkisholm. Next, all the large departures of barometer level at Ponta Delgada of .118 inch and above were compared with the corresponding simultaneous pressure departures at Stykkisholm and the means of the whole derived. From these comparisons it is found that the departures at the two places have opposite signs in 77 per cent of the cases.

The greatest negative departures of the pressure at Ponta Delgada are attended by positive departures at Stykkisholm in 83 per cent of the cases. With great positive departures at Ponta Delgada negative departures are found to coexist at Stykkisholm in 71 per cent of the instances examined.

In a similar manner the correspondence of the variations of pressure at Ponta Delgada with the great positive and negative departures at Stykkisholm were examined. The results are even more decisive, for negative departures at Ponta Delgada are found to correspond to the greatest positive departures at Stykkisholm in 80 per cent of the cases. Eighty-seven per cent of the greatest negative departures of pressure at Stykkisholm have corresponding positive departures at Ponta Delgada. It will be seen, therefore, that departures in the opposite sense occur in 83 per cent of the cases.

It may therefore be asserted that the two centers of action of the atmosphere in the North Atlantic, the high pressure area near the Azores, and the low pressure area over Iceland are interdependent.

It is to be remarked in this connection that when the absolute pressure at the Azores is higher than the average, and at the same time the absolute pressure at Iceland is below the mean as happens in more than 70 per cent of the cases, then in consequence of the gradient over the North Atlantic being greater than the normal the atmospheric machine works more actively and the warm oceanic winds from the west sweep over western and central Europe. Conversely, when the pressure at the Azores is reduced, and the pressure at Iceland increased at the same time as is generally the case, then the pressure gradient from south to north is weakened or even reversed, and the moderating influence of the Icelandic low on the climate of northwest Europe diminishes or even disappears.

It is to be observed that there may be large positive or negative departures of temperature in central Europe without the pressure at Stykkisholm being either high or low: e. g., the radiation winter 1879–1880, when clear, cold weather prevailed, had low pressure in Iceland, but the pressure was also low at Ponta Delgada.

The cases in which the pressure at the Azores is increased while that in Iceland is reduced are theoretically the most interesting. On the contrary, if the pressure at the Azores is lower and that in Iceland is higher this may be due and often is so, as in the winter of 1880–81 to a displacement of the anticyclone to the north, and at such times no theoretical reasoning can be based on the apparent gradient from the Azores to Iceland. However, when the pressure at the Azores is unusually high this can not well be considered as a simple displacement of the subtropical anticyclone, but only as a greater intensity of it owing to increased activity of the atmospheric circulation.

When the northeast trade blows much stronger than usual this will tend to increase the barometric maximum on its right hand. This will increase the atmospheric whirl over the North Atlantic Ocean and thereby the pressure minimum at its center near Iceland will be deepened.

The increased pressure at the Azores and the deepening of the minimum over Iceland which is connected therewith may thus be related to each other as cause and effect. This consideration imparts more theoretical interest to the circumstance above demonstrated, that decided positive pressure departures at the Azores occur together with negative ones in Iceland. That the probability of this relation only reaches 70 to 80 per cent may be attributed to the fact that the reasoning is based on the pressure conditions at two fixed points in consequence of which lateral displacements of the central areas of high or low pressure may easily produce apparent exceptions.

It is only isobaric maps of the Atlantic Ocean that can give the true key to all cases. In order to study these for 50 years it will be necessary to have 600 monthly maps; it will be fully 20 years before the "Hoffmeyer Charts" have reached that age and even then it will be found that the most convenient and shortest expression for the gradient over the North Atlantic Ocean will be afforded by the difference of pressure between the two stations of Ponta Delgada and Stykkisholm.—*E. R. Miller.*

## THE SUGAR BEET AND ITS CLIMATIC ENVIRONMENT.

The Bureau of Chemistry has just published Bulletin No. 95 "The Influence of Environment upon the Composition of the Sugar Beet". This is in continuation of previous Bulletins Nos. 64, 74, 78, on the same subject, and represents the results of the fourth year of the study. Eleven stations including that at Washington, D. C., have been considered, viz: The Agricultural Experiment Stations of Colorado, Fort Collins; Iowa, Ames; Indiana, Lafayette; Kentucky, Lexington; New York, Geneva and Ithaca; Oregon, Union; Wisconsin, Madison; Wyoming, Laramie.



At all these stations a uniform variety of beet was furnished from the Bureau of Chemistry with fairly uniform directions as to sowing and cultivation. Samples of the soils were sent to the Bureau for analysis, and complete meteorological data were tabulated. About a month prior to the usual time of harvest in the respective localities a sample harvest of 25 beets was gathered and forwarded to the Bureau of Chemistry. This sampling was repeated weekly until the frost prevented further operations, or the beets began to deteriorate. In some cases irrigation was practiced, alongside of other experimental plats which had no irrigation.

At the Washington station, on the Potomac flats, the soil on which the beets were grown had been made artificially by dredging the channel of the Potomac River.

At the end of the Bulletin Doctor Wiley summarizes the conclusions from which we take the following notes as to the influence of the climate:

In general it will be seen that the content of sugar in the beet varies with latitude, the lowest sugar content in the lowest latitude and vice versa. While, as is to be expected, there are variations in this curve, the general statement that the content of sugar rises as the latitude increases is again established. There is a less definite relation between the hours of sunshine and the sugar content of the beet. Inasmuch as it is generally conceded that the formation of sugar in the plant is a function which is largely influenced by light and can not be conducted without it, it seems only reasonable to suppose that the greater the quantity of light the greater the quantity of sugar developed. It is evident, therefore, that as the latitude increases the number of hours of light increases, thus giving the plant laboratory a longer working day. It has also been pointed out that light is more important than clear sunshine, since those radiations of the sun which are most active in stimulating the cellular activity of plants seem to suffer no marked diminution of power in passing through strata of aqueous vapor. The number of clear days varies greatly at different stations; the lowest number was at Ithaca: Washington, Lexington, Lafayette, and Ames all had a very large number of clear days in proportion to the number of days in the month.

* * * There is an intimate relation between the percentage of sugar in the beet and the length of the day. * * * The purity of the beets bears a very close relation to the quantity of sugar. * * * The temperature of the air varies inversely as the sugar content of the beet being highest when the sugar is lowest and lowest where the sugar is highest. * * * There is a general agreement between the percentage of sugar in the beet and the altitude of the station, but this agreement is not uniform, and it is evident that the only effect of the altitude will be found in diminishing the temperature, and that otherwise it can not have any possible effect upon the composition of the beet. There is an apparent relation between the amount of rainfall and the sugar content, the curves rising together, but this may be regarded as an indication of no value, but rather as accidental, and, moreover, there are wide and violent variations from the general agreement. The distribution of rainfall appears to have had no direct effect upon the content of sugar in the beet. It is evident, however, that there might be such a distribution of rainfall as to influence unfavorably the sugar content, and this has been pointed out in the discussion of the data of the various stations. There would be undoubtedly a tendency of the rainfall to diminish the sugar content if it should be so distributed as to restrain the normal growth of the beet during the growing period, especially in August, or to unduly stimulate it by excessive rainfall during the period when ripening would naturally take place, as in September and October. A number of instances of this kind have already been pointed out.

As Professor Wiley seems to have satisfactorily demonstrated by four years of special study in this country (confirming many years of experience in Europe) that the beet, like the cabbage and probably other plants, increases the sweetness of its juice in proportion as it is grown in more northern latitudes, it is natural at first thought to attribute this to the coldness of the climate or to the increase in length of the day and consequently in the total amount of sunshine during the growing period. But if we analyze the matter carefully, we shall see that it is probably not the temperature of the air as such or the length of the day as such that is important. So long as the temperature is above freezing and the surrounding air is moist the action of the sunlight and of the diffuse sky light